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Job Creation and Job Destruction by Small Firms: An Empirical Investigation for the Dutch Manufacturing Sector

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ABSTRACT. This paper studies the differences in behaviour of small and large firms, concerning job creation and job destruction, in the Dutch manufacturing sector over the period 1978–1991. We find that both job creation and job destruction rates are higher in small firms than in large ones. In addition, we found that the persistence of jobs created in slumps are much higher for small firms than for large firms. Persistence rates of job destruction are, however, less connected to the state of the business cycle and increase with firm size. More importantly, small firms seem to reallocate their jobs in a continuous way, as job turnover moves independent of the business cycle. Large firms, on the other hand, reallocate counter-cyclically. An obvious explanation for this phenomenon is that small firms are better equipped to adjust to shifts in economic circumstances. Large firms adjust only slowly and for them reallocating jobs in a recession is more advantageous than in a boom.

1. Introduction

In the wake of the seminal papers of Leonard (1987) and Dunne *et al.* (1989), followed by Davis and Haltiwanger (1990, 1992) on job creation and job destruction in the U.S.A., a host of empirical studies on job flows in other countries have been issued. See, e.g. Boeri (1994) and Burda and Wyplosz (1994) for Germany, Contini and Revelli (1993) for Italy, Blanchflower and Burgess (1994) and Konings (1995) for the U.K., Albæk and Sørensen (1994) for Denmark, Klette and Mathiassen (1994) for Norway.

This paper focuses on the difference in behaviour between small and large firms in job creation and job destruction. Starting with the seminal paper of Birch (1981), that posited small firms as the major creators of jobs, there have issued numerous studies that confirm this finding. The research of Davis and Haltiwanger (1990) on job creation and job destruction in the U.S.A. also shows that job creation and job destruction rates are higher in small establishments than in large ones. Blanchflower and Burgess (1994) report the same fact for the U.K. However, Davis *et al.* (1993) warn that there are a number of statistical pitfalls which lead to an upward bias in job creation by small firms. This bias arises from transitory deviations in employment from a firm's optimal size. Firms that are only temporarily below their optimal level are overrepresented in the lower size classes. One way to correct for this bias is by defining firm size as an average of two or more periods.

The Dutch labour market is usually characterized as being inflexible. It is believed that tough laws on dismissal of workers are the main reason for the fact that job destruction is relatively low. At the same time, these laws may have prevented new jobs being created, due to the fear that in bad times it would be difficult to adjust employment downwards. This inflexibility hits small firms more than large firms. Large firms can benefit from a substantial internal labour market to destroy unprofitable or redundant jobs and provide the corresponding worker the opportunity to occupy another (new or vacant) job in the same firm. Such a shift in position inside a firm is not taken into account in most (including our)

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measures of job creation and job destruction. Small firms do not have a large internal labour market. Therefore, there is a belief that job creation and job destruction rates in The Netherlands are lower than those in countries with less strict laws. Finally, we will discuss the implications of our findings for economic theory. Recent theories on job creation and job destruction that take account of firm size are those of White (1982), Brock and Evans (1989), Phillips and Kirchhoff (1989), Loveman and Sengenberger (1991) and Gertler and Gilchrist (1994).

The main conclusions from our study are the following. First, firms are very heterogeneous when different sizes are considered. This, however, may hardly come as a surprise, as nowadays it is a well-established fact from labour market studies using micro-economic data that there is no such thing as a 'representative firm'. Second, in spite of the arguments presented above, we do find that job creation and job destruction rates of small firms are considerably higher than those in large firms. As a consequence, small firms also have higher job turnover rates than large firms. Moreover, the timing of job turnover also differs between small and large firms. If job turnover is connected to the process of restructuring or reallocation going on in a firm, we find that large firms tend to restructure their labour force in periods of economic downturn, whereas small firms restructure more or less independent of the state of the business cycle. We also find that, over the sample, net employment has increased in small firms, whereas in large firms employment fell. Particularly interesting is the fact that the share of small firms in total job creation is still substantial. Small firms, i.e. with less than 100 employees, account for roughly 50 percent in total job creation. In case of job destruction, this share is lower. These features stress the importance of small firms in the processes of job creation and employment growth.

Another interesting point that deserves attention is that the persistence rates of created and destroyed jobs differs over the business cycle and with firms size. Persistence rates of jobs created in an upsurge are more or less the same for firms of different size; about two-thirds of the jobs created still exist the next year. However, jobs created in a downturn are more likely to survive in small firms than in large ones. In addition, in all states of the business cycle, we find that the persistence of destroyed jobs is higher in large firms than in small ones.

This paper is organized as follows. In Section 2 we describe the data and define our measures of the various job flows. Then, in Section 3 we give some stylized facts on job creation and job destruction in The Netherlands. In Section 4, we elaborate by disaggregating the data. How well our findings are in line with existing theories is discussed in Section 5 and Section 6 concludes.

2. Data and definitions

All empirical studies of job flows rely on longitudinal plant- or firm-level employment observations. For The Netherlands, we have two potential sources. The one used by Hamermesh *et al.* (1994) is based on a rich data set of Dutch enterprises in all sectors. The major drawback of this data base is that its availability is limited to two years. Our source is based on firm-level data in the manufacturing sector over the period 1978–1991. Hence, it covers a complete cycle. A disadvantage is that this set contains no information on other sectors.

The data we use are provided by the Netherlands Central Bureau of Statistics (CBS) and consists of a sample of 3,044 firms observed over the period 1978–1991. Our data are collected at the firm-level instead of the establishment-level. This causes a downward bias to job creation and destruction, because jobs created and lost by different establishments of the same firm will cancel out. As a result, our measures of job creation and destruction underestimate the true magnitude of job creation and destruction.

The database contains information about firms with respect to the number of employees and a number of other issues. It is based on firms having more than 10 employees and gives a complete coverage of all manufacturing firms that fulfil this criterion. The very small businesses, with less then 10 employees are not taken into account. This is another reason why our job creation and destruction measures underestimate the true values. Finally, we cannot adequately take into account job creation and destruction due to the entry and exit of firms. There is attrition in these statistics

because of mergers, firms dropping below the employment threshold, changes in legal status or location, management buy-outs, etc. Cf. OECD (1994). Considering continuing firms only leads to a reduction of some 60 percent in the number of firms that are included in the statistics in all 14 years.

We define our measures of job flows according to the standard, as set out in Davis and Haltiwanger (1990). When $emp_{e,t}$ is the number of employees in firm e at time t, then the size of the firm is defined as

$$x_{e,t} = \frac{1}{2}(emp_{e,t} + emp_{e,t-1}). \tag{1}$$

Furthermore, the growth rate $g_{e,t}$ of firm e is defined as

$$g_{e,t} = \frac{\Delta emp_{e,t}}{x_{e,t}}. \tag{2}$$

This differs from the usual definition of a growth rate where a certain base-year, usually $emp_{e,t-1}$, serves as denominator, as in Blanchflower and Burgess (1994). We use $x_{e,t}$ as denominator to avoid problems with firms that start operating in year t for which $emp_{e,t-1} = 0$. Moreover, this definition is less sensitive to the so-called regression-to-the-mean bias, than the standard definition with $emp_{e,t-1}$ as denominator. Cf. Davis *et al.* (1993). We will return to this issue later.

Gross job creation in firms of size s at time t is defined as

$$JC_{s,t} = \sum_{e \in E_{s,t},\, g_{e,t} > 0} \left(\frac{x_{e,t}}{X_{s,t}}\right) g_{e,t} = \sum_{e \in E_{s,t}} \left(\frac{\Delta emp_{e,t}}{X_{s,t}}\right), \tag{3}$$

where $\Delta emp_{e,t} < 0$,

$\Delta emp_{e,t} = emp_{e,t} - emp_{e,t-1}$, $E_{s,t}$ is the set of firms of size s at time t and $X_{s,t}$ is the size of all firms in size class s,

$$X_{s,t} = \sum_{e \in E_{s,t}} x_{e,t}. \tag{4}$$

Gross job destruction is defined analogously, hence,

$$JD_{s,t} = \sum_{e \in E_{s,t},\, g_{e,t} < 0} \left(\frac{x_{e,t}}{X_{s,t}}\right) |g_{e,t}| = \sum_{e \in E_{s,t}} \left(\frac{-\Delta emp_{e,t}}{X_{s,t}}\right), \tag{5}$$

where $\Delta emp_{e,t} < 0$,

The sum of *JC* and *JD* is a measure of job reallocation or job turnover between $t-1$ and t, so

$$JR_{s,t} = JC_{s,t} + JD_{s,t}. \tag{6}$$

Now $X_{s,t} JR_{s,t}$ measures the change in employment positions in size class s between $t-1$ and t. This is an upper bound on the number of workers who switch between employment and non-employment. A lower bound on the number of workers who change jobs or employment status in direct response to job reallocation is measured by $X_{s,t} MAX_{s,t}$, where

$$MAX_{s,t} = \max\{JC_{s,t}, JD_{s,t}\}. \tag{7}$$

With these definitions, we can describe and analyze the job flows. A measure for heterogeneity among firms can be obtained by taking job turnover in excess of the absolute value of the net employment change. This is an indication of the dispersion of firm growth around the mean of net employment change,

$$EXC_{s,t} = JR_{s,t} - |\Delta EMP_{s,t}|, \tag{8}$$

where $EMP_{s,t}$ is the employment in size class s at time t, which is the sum of the firm-level employment $emp_{e,t}$ over all firms e in size class s. The absolute net employment change can be interpreted as the minimally required amount of job reallocation. Hence, $EXC_{s,t}$ shows the importance of simultaneous job creation and destruction within a certain size class, in other words: the heterogeneity within such a class.

Finally, the persistence of created and destroyed jobs is determined as follows. Newly created jobs at e in t equal $emp_{e,t} - emp_{e,t-1}$. If $emp_{e,t+1} \geq emp_{e,t}$, then all of these newly created jobs still exist in $t+1$. If $emp_{e,t+1} \leq emp_{e,t}$ none of these jobs is present in $t+1$. Next, if $emp_{e,t+1} \in [emp_{e,t-1}, emp_{e,t}]$, then $emp_{e,t+1} - emp_{e,t-1}$ of the newly created job are still present in $t+1$. Carrying out this exercise for all growing firms in t and dividing the result by *JC* yields the persistence of created jobs, *PJC*. The persistence of destroyed jobs, *PJD*, is calculated analogously.

3. Stylized facts

Table I summarizes the main statistical characteristics of the variables introduced in the previous section for the entire manufacturing sector. We distinguish job flows due to continuing firms and due to entry and exit of firms. Manufacturing employment dropped almost 1 percent in firms that continuously operated during the whole sample. *JC* is dominant to *JD*, as far as volatility is concerned. Hence, *JC* also dominates in *JR*, which therefore has an insignificantly positive correlation with net employment change. However, casual observation reveals that there exists an upward trend in *JR*, caused by an upward trend in *JD* and especially in *JC*. When this trend is removed, we find a negative correlation, which is however still insignificant. So for continuing firms, there seems to be some evidence that reallocation behaves counter-cyclically, although this evidence is rather weak.

Job flow statistics contain attrition due to entry and exit of firms. Apart from the issues mentioned before, new firms that start from scratch will usually be very small and may not reach the threshold of 10 employees. However, a large proportion of new firms in our panel still consist of actual firm openings. The same is true for the exit of firms that stop operating. The OECD (1994) presents evidence that 70 percent of French birth and death rates of firms concern the actual opening and closure of firms. The rest concerns entries due to a take-over or opening of a subsidiary of an existing firm. For Germany, these percentages are reported to range between 80 and 90 percent.

Another source for the actual contribution of entry and exit to job creation and job destruction

TABLE I
Statistical characteristics of manufacturing job flows in The Netherlands, 1979–1991 (in percentages of employments)

Variable	Mean	Standard deviation[a]	Maximum	Minimum
Continuing firms:				
JC	3.62	1.08 (0.81)	5.18	1.74
JD	4.46	0.86 (0.86)	5.81	3.32
JR	8.08	0.84	9.88	6.57
Δ*EMP*	–0.84	1.76	1.13	–3.57
EXC	6.63	1.60	9.41	3.49
PJC	56.4	12.2	71.2	41.5
PJD	59.4	9.52	73.7	46.8
Entry/exit:				
JC	3.76	0.90 (0.84)	5.74	2.69
JD	3.35	0.91 (0.90)	5.36	2.10
JR	7.10	1.60	11.1	5.15
Δ*EMP*	0.41	0.85	1.53	–1.41
EXC	6.31	1.73	10.7	4.20
All firms:				
JC	7.37	1.31 (0.80)	9.35	4.79
JD	7.80	1.59 (1.59)	11.2	5.42
JR	15.2	1.96	19.3	12.7
Δ*EMP*	–0.43	2.16	2.60	–3.82
EXC	13.4	2.28	17.3	9.58
Correlations:[b, c]				
Continuing firms	$\rho(JR, \Delta EMP) = 0.28$ [0.97]		$\rho(JR_c, \Delta EMP_c) = -0.10$ [0.33]	
Entry/exit	$\rho(JR, \Delta EMP) = -0.01$ [0.03]		$\rho(JR_c, \Delta EMP_c) = -0.10$ [0.33]	
All firms	$\rho(JR, \Delta EMP) = -0.20$ [0.68]		$\rho(JR_c, \Delta EMP_c) = -0.59$ [2.42]	

[a] Values after trend removal in parentheses.
[b] *t*-values in square brackets.
[c] Subscript *c* denotes variables after removing the trend.

is provided by Hamermesh (1991), who approximates this contribution to roughly one third of total gross job flows. Davis and Haltiwanger (1992) find that 25 percent of *JC* is due to entry and 20 percent of *JD* is due to exit. This boils down to roughly two to five percent of employment. The OECD (1994) reports figures on job creation and job destruction due to entry and exit for German manufacturing of one to two percent of employment. For France and a number of other (European) countries these rate range between two and six percent. In our data set we have no information on the actual entry and exit of firms. However, related survey evidence indicates that only a limited proportion, of say up to 25 percent of the reported entry and exit data of Table I, are the actual opening and closing of a firm. Hence, the actual entry and exit figures for The Netherlands are close to those for Germany.

Manufacturing employment due to entry and exit increased with some 0.4 percent. Note that the variance in net employment change is rather flat compared to continuing firms, especially in the second half of the 1980's. Further, the variance in exit slightly dominates the variance in entry, both with and without trend removal. Hence, *JR* due to entry and exit is negatively correlated with net employment change.

If job flows in continuing firms and entry and exit are taken together, we find figures for job creation and destruction comparable in size with studies done for a number of other European countries. Cf. OECD (1987, 1994) and Burda and Wyplosz (1994). In 1981 *JD* rose to almost 9 percent, while *JC* reached a low of 4.7 percent. Two years later, *JD* had increased to more than 11 percent, but *JC* had also increased to some 8 percent, yielding a high of almost 20 percent of total job reallocation *JR*. The latter increase in *JC* and *JD* was to some extent due to a high exit and entry of firms. Total job reallocation started increasing again at the end of the 1980's, when both *JC* and *JD* started to rise. When we consider all firms, the variance in *JD* clearly dominates that in *JC*, especially when the upward trend is removed. In that case, we find a significant negative correlation between *JR* and ΔEMP. This provides corroborating evidence in favour of many other studies for a counter-cyclical pattern in job reallocation. Cf. Davis and Haltiwanger (1990, 1992); Burda and Wyplosz (1994); Konings (1995).

The OECD (1987) has introduced a measure of 'normal' or 'structural' job reallocation, defined as the sum of job creation at the trough of a recession and job destruction at the peak of an economic upsurge. Basically, this structural component represents the amount of job turnover occurring in an economy, regardless of the economic circumstances. We found that for all firms this structural component was about 12 percent. Hence, 80 percent of total reallocation is due to structural factors and 20 percent is due to cyclical factors. When we disaggregate by size later, we find that this structural component is slightly higher for large firms. Of course, we should note that this is a very rough measure of structural job turnover and caution should be exercised before generalizations are made.

Finally, *EXC* in Table I shows the importance of simultaneous job creation and job destruction in the Dutch manufacturing sector. The excess reallocation ranges roughly from 10 to 17 percent of manufacturing employment. A non-zero value of *EXC* implies that firms are not homogeneous.

The levels of persistence of created and destroyed jobs are also presented in Table I for continuing firms. Over the whole sample, 56 percent of the jobs created in year t still existed in year $t + 1$, while almost the 60 percent of jobs destroyed in year t remain destroyed in $t + 1$. Davis and Haltiwanger (1992) find values of 67 and 81 percent, respectively, and Konings (1995) reports 62 and 81 percent, respectively, for large U.K. firms only.

These values change with the cycle. Of the jobs created in the period of economic downturn from 1979–1983, only 43 percent still existed a year later, whereas during the upsurge of 1984–1990, this was 65 percent. For the persistence of destroyed jobs these percentages are 65 and 55, respectively. What can be concluded from these measures is that not only the level of persistence is larger in case of job destruction compared to job creation, but also that the volatility in persistence of newly created jobs is larger than the persistence of destroyed jobs.

4. Disaggregation by firm size

The size class a firm belongs to is determined by the number of workers employed by the firm. In this paper, we distinguish six size classes. Three categories make up the set of small firms, according to OECD standards: small firms with 10–19, 20–49 and 50–99 employees. Next, firms with 100–199 and 200–499 employees make up the set of medium-sized firms and we finally distinguish firms with more than 500 employees, which represent the set of large firms.

Table II shows the averages of net and gross job flows by firm size, where we distinguish flows due to firms that continuously operate during the whole sample and flows due to entry and exit of firms. For job flows due to both continuing firms and entry and exit, we can observe tremendous heterogeneity. Job reallocation rates decline sharply with firm size. The very small firms, with less then 20 employees, have the highest rates of job creation, but also of job destruction. For continuing firms, job turnover peaks at almost 12 percent of employment, while for the category of large firms, with more than 500 employees, it is only half this value. Medium sized firms have rates somewhere in between.

If job creation and job destruction due to entry and exit of firms is taken into account in Table II, the share of small firms becomes even more pronounced. Not surprisingly, almost all new firms that come into operation are very small in size. Small firms are, however, also more likely to close. Research on the distribution of new firms by size class shows that virtually all entry of new firms consists of firms with less than 20

TABLE II
Average job flow rates of manufacturing firms by different size and correlation with net employment change, 1979–1991

No. of employees (s)	JC_s	JD_s	JR_s	ΔEMP_s	$\rho(JR_s, \Delta EMP_s)$	$\rho(JR_{c,s}, \Delta EMP_{c,s})$[a]
Continuing firms						
10–19	6.56	5.09	11.7	1.46	0.30	0.30
20–49	6.11	5.41	11.5	0.70	0.65	0.24
50–99	4.97	4.73	9.70	0.24	0.70	0.40
100–199	4.32	4.59	8.91	–0.27	0.26	–0.38
200–499	3.33	4.68	8.01	–1.35	–0.06	–0.21
> 500	2.08	4.17	6.15	–2.09	–0.44	–0.44
10–99	5.37	4.74	10.1	0.63	0.67	0.45
> 100	2.72	4.25	6.98	–1.53	–0.11	–0.34
Entry/exit						
10–19[b]	15.9	10.9	26.8	5.00	–0.01	–0.05
20–49	6.08	4.84	10.9	1.24	0.30	0.33
50–99	4.42	4.59	9.01	–0.17	–0.20	–0.04
100–199	3.82	3.90	7.72	–0.08	–0.66	–0.50
200–499	2.54	3.01	5.55	–0.47	–0.48	–0.38
> 500	1.21	0.83	2.04	0.38	0.30	0.29
10–99	7.51	6.49	14.0	1.02	0.13	–0.01
> 100	1.93	1.81	3.74	0.11	–0.20	–0.06
All firms						
10–19[b]	22.5	16.0	38.5	6.50	0.10	–0.06
20–49	12.2	10.3	22.5	1.90	0.28	–0.14
50–99	9.39	9.32	18.7	0.07	–0.42	–0.27
100–199	8.04	8.49	16.6	–0.35	–0.50	–0.46
200–499	5.87	7.69	13.6	–1.82	–0.54	–0.53
> 500	3.29	5.00	8.29	–1.71	–0.75	–0.74
10–99	12.9	11.2	24.1	0.63	0.33	–0.29
> 100	4.65	6.06	10.7	–1.41	–0.62	–0.68

[a] Subscript c denotes variables corrected for upward trend.
[b] Job flows for this category based on 1979–1986 due to break in 1987, correlations based on entire sample.

employees. The OECD (1994) reports that in Sweden 75 percent of job creation due to entry was by firms with less than 100 employees. For the U.K., this was 95 percent. Small firms are also more likely to exit: 74 percent of the exits in Sweden were small firms, while this fraction is 83 percent for the U.K. For other countries mentioned in the study, rates in between those two extremes were found. For The Netherlands, some 65 percent of jobs created due to entry, were created by small firms, whereas 63 percent of jobs disappearing due to exit, were destroyed by small firms.

The data show a huge increase in both entry and exit rates of very small firms (10–19 employees) in the second half of the 1980's. In part this may have to do with the improvement in business opportunities during that period. It may also reflect the merger-wave that occurred in The Netherlands during that period, as argued by De Jong (1988). The most likely cause, however, is a major change in the definition of many economic variables in The Netherlands in 1987. See CBS (1991). On the other hand, the OECD (1994) reports that the opening (and closing) of new establishments was relatively stable in most European countries in the second half of the 1980's. We will therefore consider entry and exit of very small firms only over the period 1979–1986 and assume that this is a reasonable representation for 1987–1991 as well.

Table II shows that employment in the set of very small firms, with 10–19 employees increased substantially. In medium-sized and large firms, with more than 100 employees, employment decreased. Note also that the standard deviation of job creation (not reported) is much larger for small firms than large ones. Volatility of job destruction is spread more evenly among firms of different size. This implies that not only the level of job creation of small firms is higher, but also that job creation is a much more important driving variable in job turnover for small firms than for large ones.

Information on job creation and destruction in firms with less than 10 employees is not currently available. There is, however, some information on the change in the distribution of employment between firms of different size, including firms with less than 10 employees. In The Netherlands, the share of employment in firms with less than 10 employees increased a full percentage point in 1988–1990. The same is true in most European countries. At the same time, the employment share of large firms has dropped. Cf. EIM (1994).

When both continuing firms and entry and exit are taken into account, we find that job turnover in small firms does not have a clear cyclical pattern. When a positive trend is removed, the last column of Table II shows that small firm job turnover has an insignificant negative correlation with net employment change. However, if we only consider continuing firms, small firm job turnover is positively correlated with net employment change after the trend is removed. For larger firms the correlation is negative throughout. Davis and Haltiwanger (1992) also report a negative correlation between JR and ΔEMP for all firms, but do not report correlations for firms of different size. Konings (1995) studies only large firms in the U.K. and reports a significant negative correlation between job reallocation and net employment for that category of firm.

In continuing firms with up to 100 employees, the period of economic decline in the early 1980's increased job turnover. In the second half of the 1980's, job turnover in small firms also rose. On the other hand, in large firms there was high turnover during the period of recession in the early 1980's, whereas in the subsequent upsurge the turnover rate was relatively low. This difference in job turnover is linked to differences in the rates of job creation and destruction in the firms of various sizes. In both large and small firms, the recession of the early 1980's increased job destruction. However, in the subsequent recovery period, we find a large increase in the rate of job creation in small firms, whereas job creation in large firms is only modest in that period.

In addition to the average job creation and destruction rates in Table II, Figures 1 to 4 give the pattern of the various job flows for small firms with less than 100, and medium and large ones, with more than 100 employees for 1979–1991. Figure 1 clearly shows that, apart from the two recession periods 1981–1983 and 1987, job creation exceeded job destruction in small firms, so employment increased. Figure 2 shows that for large firms, job destruction is in excess of job creation throughout the whole period, except for 1985–1986 and 1989–1990. Significantly, in the economic downturn of the early 1980's job

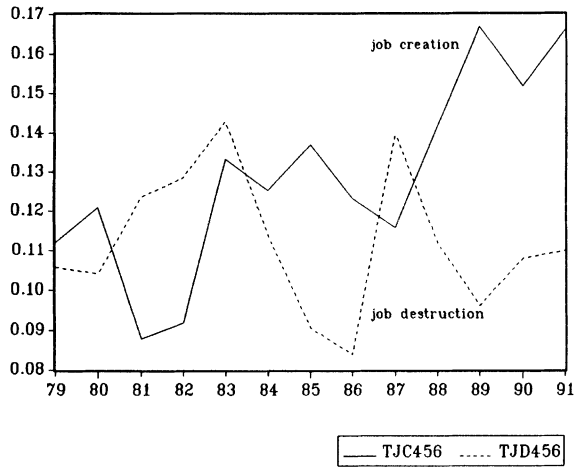

Fig. 1. Total job creation and job destruction rates of small firms (10–100 employees) in The Netherlands, 1979–1991.

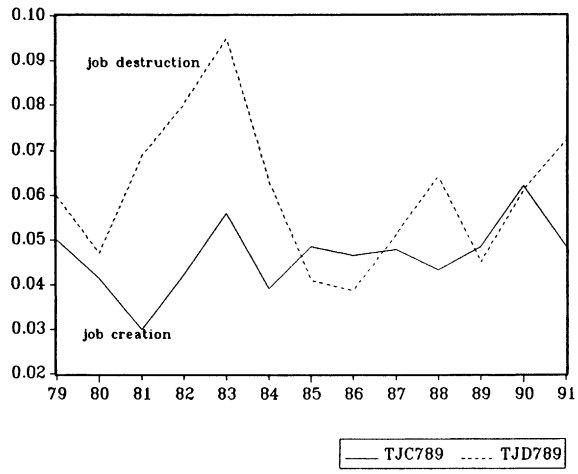

Fig. 2. Total job creation and job destruction rates of larger firms (> 100 employees) in The Netherlands, 1979–1991.

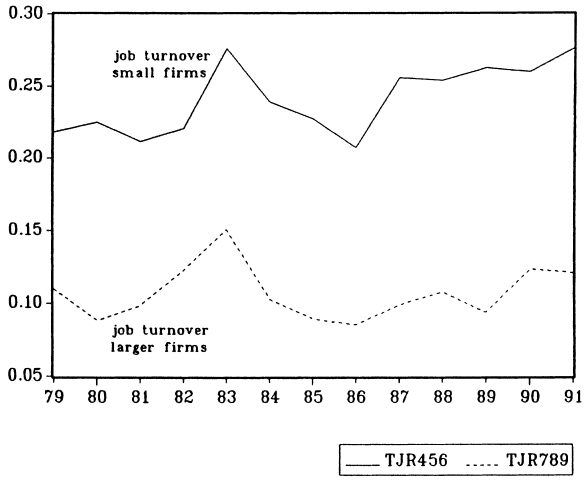

Fig. 3. Job turnover rates of small firms (10–100 employees) and larger firms (> 100 employees) in The Netherlands.

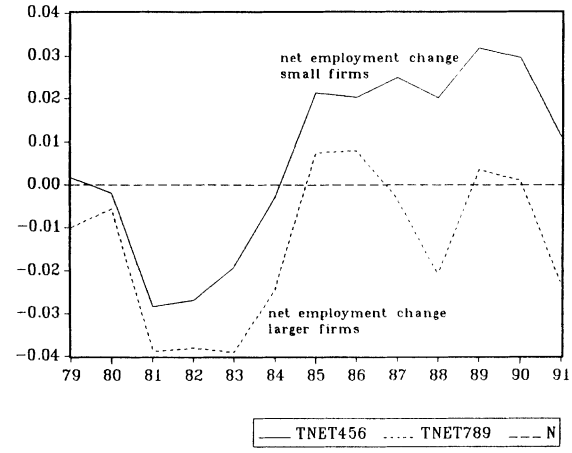

Fig. 4. Net change in employment in small firms (10–100 employees) and larger firms (> 100 employees) in The Netherlands.

destruction rates were almost 5 percentage points larger than job creation rates. Figure 3 is also revealing. It shows that job turnover rates in small firms are twice as large as job turnover rates in medium-sized and large firms. Note that the increase in turnover for small firms in 1987 is probably caused by a change in definition. Finally, Figure 4 presents the net employment change for both size categories. In the second half of the 1980's, employment grew continuously for small firms, whereas for larger firms this was only the case for 1985–1986 and 1989–1990.

Even though the results of Table II and the Figures are interesting, they only tell us that the contribution of small firms to the process of job creation and job destruction matters as far as *rates* are concerned. This, however, may hardly be surprising if it is assumed that each firm in each size category has the same probability of opening up a new job. Therefore, in Table III, we also consider the job creation and job destruction shares in total job creation and destruction for different size classes. In this case, the contribution of small firms in total job creation is also quite substantial. When the entry and exit of firms is being taken into account, this phenomenon is even more pronounced.

Since gross job creation and job destruction

TABLE III
Average shares in total job creation and job destruction of firms of different size (percentages), 1979–1991

No. of employees (s)	JC_s	JD_s
Continuing firms		
10–19	10.5	6.6
20–49	21.7	15.5
50–99	16.0	12.3
100–199	15.1	12.7
200–499	13.7	15.7
> 500	22.8	37.2
10–99	48.4	34.4
> 100	51.6	65.6
All firms, including entry and exit		
10–19	20.2	16.2
20–49	20.9	16.6
50–99	14.8	13.7
100–199	13.7	15.7
200–499	11.8	14.7
> 500	18.6	25.4
10–99	55.9	46.6
> 100	44.1	53.4

reflect the dynamic evolution of the size of firms, we have also computed Markov transition matrices of firm size. These matrices reflect job creation and destruction between different size classes. They denote which fraction of firms of size class *i* has moved to higher or lower size classes. These matrices are reported in Table IV for a period of economic downturn, 1981–1982, an economic upsurge, 1989–1990 and for the entire sample period. Table IV shows that, apart from the firms in the smallest size class, nearly all firms remain within the same class, when transitions from one year to another are considered. Hence, the job creation and destruction rates presented in Table II are not affected in a disturbing way by firms crossing the boundary between different firm sizes. Only the very small firms have experienced such growth in employment that in the economic upsurge of 1989–1990 in The Netherlands, 50 percent moved to a higher size class. However, note first that we only use the balanced panel to compute the Markov matrices. Secondly, the small firms in our data set are based on a representative sample of all small manufacturing firms. This implies that the frequency of very small firms,

TABLE IV
Markov transition matrices of firms size for three different periods

Size class	10–19	20–49	50–99	100–199	200–499	< 500
1981–1982						
10–19	90.9	9.1	0.0	0.0	0.0	0.0
20–49	1.1	97.2	1.7	0.0	0.0	0.0
50–99	0.0	7.4	89.4	3.2	0.0	0.0
100–199	0.0	0.0	9.4	89.6	1.0	0.0
200–499	0.0	0.0	0.0	8.9	91.1	0.0
> 500	0.0	0.0	0.0	0.0	10.0	90.0
1989–1990						
10–19	50.0	50.0	0.0	0.0	0.0	0.0
20–49	0.1	93.2	6.6	0.1	0.0	0.0
50–99	0.8	1.8	92.5	4.9	0.0	0.0
100–199	0.0	0.0	3.2	92.7	3.5	0.0
200–499	0.0	0.0	0.0	3.3	93.9	2.8
> 500	0.0	0.0	0.0	0.0	1.5	98.5
1979–1991						
10–19	0.0	100.0	0.0	0.0	0.0	0.0
20–49	2.6	65.4	29.5	2.5	0.0	0.0
50–99	0.7	18.8	57.2	21.4	1.9	0.0
100–199	0.0	3.2	25.0	52.9	18.9	0.0
200–499	0.0	1.2	3.0	25.6	60.7	9.5
> 500	0.0	0.0	0.0	3.9	20.5	75.6

with less than 20 employees, is rather small. This also accounts for the fact that, in the matrix covering the entire sample, all firms starting with less than 20 employees have moved to the next size class at the end.

The persistence rates of created and destroyed jobs in continuing firms of different size is reported in Table V, where we distinguish between the persistence rate of the whole sample and the persistence rate of jobs created and destroyed in an economic downturn, 1979–1983, and in the subsequent upsurge, 1984–1990. Over the whole sample and in both sub-periods, we find that the persistence in destroyed jobs has the same pattern. Persistence rises with firm size. Hence, when a job is destroyed in a large firm, this job remains closed more often when compared to small firms. Obviously, the level of persistence for destroyed jobs is higher in periods of economic downturn.

The persistence rate of newly created jobs is more interesting. First of all, we find that, over the whole sample, jobs created in small firms are more persistent than jobs created in large firms. This is particularly the case for jobs created in the period 1979–1983; a period of strong economic contraction. In the recovery period 1984–1990, the persistence rate of newly created jobs is roughly the same between firms of different size.

Similar evidence on persistence, as in Table V, for other countries is limited. Davis and Haltiwanger (1992) report only aggregate persistence rates of created and destroyed jobs in U.S. manufacturing establishments. Konings (1995) finds average values of 62 and 81 percent for firms with an average employment of roughly 4,500 employees, where the persistence of created jobs moves pro-cyclically and the persistence of destroyed jobs moves counter-cyclically. Thus, comparing these persistence rates with evidence from other countries is not possible.

5. Theoretical implications

In the previous sections, we found that small and large firms exhibited different behaviour in the creation and destruction of jobs. These differences are summarized below:

– job turnover in small firms is higher than in large firms;
– job turnover in small firms takes place over the entire cycle, whereas in large firms job turnover has a counter-cyclical pattern;
– in recessions, jobs created in small firms are more persistent than those created in in large firms.

There are several explanations for the high rates of job creation and destruction, and thus job turnover, in small firms. Some are based on economic grounds, others have a purely statistical nature. The latter are regression-to-the-mean bias (RMB) or the fact that firms cross size borders. The idea of RMB is that firms which have experienced temporary bad luck are relatively overrepresented in the small firm class, while firms which have had temporary good luck are relatively overrepresented in the large firm class. As time goes by, both will return to their normal levels.

Recently, Davis *et al.* (1993) have tried to avoid

TABLE V
Persistence rates for job creation and destruction of continuing firms by firm size (in percentages)

No. of employees	PJC_s			PJD_s		
	1980–1991	1980–1984	1985–1991	1980–1991	1980–1984	1985–1991
10–19	61	55	65	30	36	27
20–49	62	54	68	38	48	31
50–99	60	53	65	48	58	40
100–199	61	51	68	55	64	48
200–499	53	37	65	61	68	56
> 500	50	33	62	74	78	72
10–99	61	54	66	41	50	35
> 100	53	37	64	68	73	64

this regression-to-the-mean bias by re-calculating the job flows using various measures of job creation and job destruction. They found this regression fallacy to be particularly disturbing when firm size was calculated for one employment base year. When, instead, our measure was used or when firm size was calculated on the basis of average plant size over the whole sample period, there was no or only a mild version of this regression fallacy.

Economic explanations for higher job creation and destruction in small firms are extensively discussed by the OECD (1994). The entry of new firms is a major source of job creation and new firms are usually small in size. However, small firms not only dominate job creation due to their entry, but continuing small firms also have higher job creation rates than large firms. One reason is the change in socio-economic conditions that occurred in the early 1970's. After World War II, the Western world encountered a period of economic stability and prosperity. The principle of economies of scale predicted a tendency towards large units of production. Diversification strategies led to huge conglomerate corporations. Mass production predominated the 1960's and 1970's and with it came uniformity of products and services.

In the second half of the 1970's, two severe recessions hit the Western economies. Uncertainty increased with high inflation and high interest rates. At the same time there was a change in consumer tastes, when the post-World-War-II-generation matured. Mass-produced products were out and products reflecting individual tastes and preferences were in. Large conglomerate corporations were unable to meet the associated shifts in demand. Combined with the increase in labour and capital costs, instigated by the two recessions, almost every country saw a lot of these corporations perishing. In contrast, small firms are much better equipped to deal with shifts in individual tastes. It is easier for small firms to specialize. In short: small firms are more flexible and adjust more smoothly to changes in economic conditions. Moreover, because of e.g. lower monitoring costs, wages paid by small firms are lower than wages paid by large firms in many countries. Cf. Brown and Medoff (1989). The same is found for The Netherlands by Oosterbeek and Van Praag (1995). This means that large firms are more reluctant to hire a new worker than small firms, since labour costs are higher for large firms. Other reasons for small firms to flourish is the cheap availability of flexibly operating computers, which allow for quick adjustment to changes. High rates of unemployment from the second part of the 1970's onwards may have increased the incentive for the unemployed to start their own (small) business. This is strengthened by the re-evaluation of the 'entrepreneurship' in the past decade and the improvement in business conditions. See, e.g., Brock and Evans (1989); Loveman and Sengenberger (1991).

On the other hand, small (new) firms also have higher rates of job destruction, mainly because of higher exit rates. This may have to do with several specific difficulties that small, new firms encounter. Mismanagement is one of the major reasons for new firms to go bankrupt, as Van der Hoeven and Verhoeven (1994) found for The Netherlands. New businessmen are in some cases just not well-prepared to deal with problems associated with running their own firm. Other reasons for high job destruction in small firms include the limited access to information concerning competitors, technology and market conditions, but also the fact that small firms may have more financial constraints compared to large firms, as Gertler and Gilchrist (1994) have pointed out. Finally, the lower turnover rates of large firms may also be a sign that they try to resolve structural changes by means of their internal labour market. Empirical evidence of Hamermesh *et al.* (1994) shows, however, that the importance of internal labour markets is only minor.

As far as the timing of job reallocation is concerned, we can distinguish two lines of thought in the current literature. One sees structural change as a continuous process. There is a relatively stable entry of new firms, through which structural changes are diffused into the economy. Cf. Baldwin and Gorecki (1990); Boeri and Cramer (1992) and Boeri (1994). In this view, job creation, especially among new firms, is the major driving variable in net employment change.

According to the other view, structural change takes place mainly in recessions. Recent literature provides a number of, not mutually exclusive, theoretical explanations. One line of reasoning

concentrates on opportunity costs, e.g. Davis and Haltiwanger (1990); Caballero and Hammour (1991, 1994); Saint-Paul (1993) and Gautier and Broersma (1995). The main message is that the reallocation of labour takes time and effort, which cannot be used for normal production. Firms will reallocate in downturns because the opportunity costs, in the form of foregone production, are lowest then. Other explanations make use of adjustment and hiring and firing costs, such as Nickell (1992) and Mortensen and Pissarides (1994). They argue that job destruction is concentrated in downturns, because fast job creation is more costly than fast job destruction. In booms labour markets are tight, which makes it more difficult to fill newly created jobs and hence lowers reallocation. This last effect is assumed to be stronger than the equally plausible effect that in downturns job destruction is more expensive, because the flow of voluntary quits is lower. A third explanation is based on the so-called 'lame duck'-effect, as argued by Blanchard and Diamond (1990). Their idea is that in bad times the fear of bankruptcy and closure is much more real in economic downturns than in upswings. Therefore firms reallocate in an economic downturn.

We find that for the Dutch manufacturing sector as a whole, the reallocation of jobs is counter-cyclical, which supports the second line of thought. However, when we disaggregate by firms of different size, we find a dichotomy between small firms, with roughly less than 100 employees, and medium-sized and large firms, with more than 100 employees. Small firms tend to reallocate more or less continuously, independent of the cycle. This makes them behave in line with the first stream. Larger firms, on the other hand, reallocate in a counter-cyclical way, which is in line with the second view. Large firms probably have more opportunities to time reallocation optimally.

Small, new, firms can be characterized as follows. New firms entering the market are usually small. Small firms, whether entering or continuing, have better opportunities to adjust more quickly to changing economic circumstances than large firms. Cf. Baldwin and Gorecki (1990). White (1982) shows that small firms are more important in industries with low capital-labour ratios, without strong vertical integration, that have local markets and that sell to other industries. Small firms appear to be relatively immune to intensive advertisement in their industry.

Finally, we have to find an explanation for the fact that the persistence of jobs created in an economic downturn are more persistent in small firms than in large firms. Persistence rates of jobs created in an upsurge hardly differ between the firms of different size. The persistence of destroyed jobs is higher in large firms than in small ones. Regression-to-the-mean bias might play a role here. Temporary deviations of the equilibrium size of the firm tend to favour the persistence rate of created jobs in small firms. However, we have argued that our measures of job creation and destruction are not severely effected by this regression fallacy. It is therefore useful to consider economic explanations.

We have already seen in Table II that the entry of new firms largely consists of small firms, with less that 100 employees. The startup of a new firm depends on a number of issues. First, on the personal characteristics of the entrepreneur. Second, on the extent to which profits from starting a new firm exceed alternative earnings, *e.g.* when working as an employee in an established firm. Third, entry may be affected by retaliation of existing firms, in the sense of imposing barriers to entry. Cf. Audretsch and Acs (1994). Skipping the personal characteristics, the expected profits of starting a new firm depend on the aggregate growth rate, induced by the macro-economic environment or the business cycle, but also on a specific market growth rate, net of the business cycle. At the same time, in a recession, unemployment increases and individuals may compare profits of starting a new firm with unemployment benefits, instead of the reservation wage mentioned earlier. This also means an increase in new-firm startups. Finally, it has been argued that barriers to entry, especially due to economies of scale in the R&D process, may hamper new-firm startups. See, e.g. Levin (1978) and Mueller and Tilton (1969), even though Audretsch and Acs (1994) find no evidence for this in US startups. We should hereby note that R&D intensities are pro-cyclical, so that these barriers are smaller in downturns. Moreover, R&D intensities in The Netherlands, are among the lowest in the industrialized world. See Minne (1992).

All this provides evidence in favour of our premise that even in an economic downturn, the number of new-firm startups can be quite substantial. Such a new startup implicitly means that, even in a recession, an entrepreneur may still see ways to exploit the growth possibilities that a certain market segment offers, e.g. with respect to tastes, preferences or production techniques. Another way to describe this feature is to say that a new firm is at the beginning of its life cycle. In that situation, a job created in such a new firm is likely to be more persistent than a job created in a large, already existing firm in an economic downturn. So it is likely that the amount of new-firm startups in the small firm sector in a recession, accounts for the relatively high persistence rate of created jobs, compared to the persistence of jobs created by large firms in a recession.

6. Concluding remarks

This paper analyses possible relations between the size of manufacturing firms in The Netherlands and their behaviour with respect to job creation and job destruction over the period 1979–1991. We use a data set based on employment observations at the firm level. We find that small firms have higher job creation and job destruction rates. However, the share of small firms in the total amount of created jobs in The Netherlands is also substantial. The contribution of small firms to net employment change might be overstated because of several statistical biases, but we have corrected for that by taking average employment over two years. There are, however, also good theoretical reasons for explaining the high rates of job creation and destruction of small firms. Small firms may have lower labour costs and lower costs of adjustment, which enables them to respond more flexibly to shifts in economic circumstances than large firms.

The timing of reallocation also differs between firms of different size. Job turnover in small firms is more or less independent of the business cycle, while large firms reallocate counter-cyclically. Hence, the process of job losses and gains is more or less symmetrical as far as small firms are concerned. For large firms there is asymmetry in the process of change between job losses and job gains. Small firms may be capable of rapid adjustment, whereas adjustment in large firms is a protracted process.

Persistence rates of jobs created and destroyed also differ between firms of different size and over the business cycle. The persistence of jobs created in a period of economic recession decreases substantially with increasing firm size. The persistence of jobs created in an economic upsurge hardly differs between firms of different sizes. The relatively high entry of new, small firms, even in a period of economic slowdown, explains these phenomena. The persistence of destroyed jobs increases with firm size, both in a slump and in a boom.

Since small firms have a high contribution to the process of job creation, but that a lot of jobs are also lost with small firms, there may be a need for policy measures to increase the survival of new, small firms. One could think of stimulating the emergence of a network local strategic resources, like business services, access to universities and centres of technological expertise, which enable new and small firms to cluster with other (large) firms and R&D institutions. Providing a good physical infrastructure and special assistance in training offered to employees in small firms and starting businessmen or -women are also important.

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